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INITIAL MMD DATE 9/30/02

PAGE NUMBERING SEQUENCE IS INCONSISTENT

Document ID: EDF-ER-286
Revision ID: 1
Effective Date: 05/14/02

Engineering Design File

Waste Placement Plan

Idaho National Engineering
and Environmental Laboratory

Form 412.14
07/24/2001
Rev. 03

ENGINEERING DESIGN FILE

1. Title: Waste Placement Plan

2. Project File No.: NA

3. Site Area and Building No.: NA

4. SSC Identification/Equipment Tag No.: NA

5. Summary:

This Waste Placement Plan (WPP) for the INEEL CERCLA Disposal Facility (ICDF) provides an overview for waste placement procedures and operational requirements associated with the facility.

6. Review (R) and Approval (A) and Acceptance (Ac) Signatures:
(See instructions for definitions of terms and significance of signatures.)

	R/A	Typed Name/Organization	Signature	Date
Performer		Monica Thurston/ CH2M HILL	Monica Thurston	05/14/02
Checker	R	(Same as Independent Peer Reviewer)		05/14/02
Independent Peer Reviewer	A	Marty Doornbos/ BBWI	Marty Doornbos	05/14/02
Approver	A	Thomas Borschel/ BBWI	Thomas F. Borschel	05/14/02
Requestor	Ac	Don Vernon/ BBWI	D Vernon	05/14/02

7. Distribution: (Name and Mail Stop)
M. Doornbos, MS 3930; D. Vernon, MS 3930; T. Borschel, MS 3930

8. Records Management Uniform File Code (UFC):

Disposition Authority: | Retention Period:

EDF pertains to NRC licensed facility or INEEL SNF program?: ☐ Yes ☐ No

9. Registered Professional Engineer's Stamp (if required)

ABSTRACT

This Waste Placement Plan for the INEEL CERCLA Disposal Facility provides an overview for waste placement procedures and operational requirements associated with the facility.

CONTENTS

FIGURES

ACRONYMS

ACM	asbestos containing material
AOC	area of contamination
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CQA	construction quality assurance
DOE-ID	Department of Energy Idaho Operations Office
EDF	engineering design file
GPS	global positioning satellite
HDPE	high-density polyethylene
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDW	investigation-derived waste
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LCRS	leachate collection recovery system
LDR	Land Disposal Restrictions
LGP	low ground profile
O&M	Operation and Maintenance
OU	operable unit
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SSSTF	Staging, Storage, Sizing, and Treatment Facility
TSCA	Toxic Substance Control Act
WAC	Waste Acceptance Criteria
WAG	Waste Area Group
WPP	Waste Placement Plan
WTS	Waste Tracking System

Waste Placement Plan

1. INTRODUCTION

The objective of this waste placement plan (WPP) is to provide direction for placing waste into the INEEL CERCLA Disposal Facility (ICDF) landfill and ICDF evaporation pond. The WPP describes the general features of the ICDF landfill and ICDF evaporation pond, the waste material descriptions, and waste placement procedures.

1.1 Facility Description

The first phase of the ICDF Complex construction consists of Cell 1 of the landfill and both the east and west evaporation ponds. Included in this phase of the work is the earthwork, the liner system, the leachate collection system, and the evaporation ponds. The access to ICDF landfill Cell 1 will initially be by an all-weather road with a maximum 10% grade located on the southern, unlined portion of the excavation. This access road will be wide enough to carry two-way traffic. The ICDF Complex will operate 12 months per year; however, the ICDF landfill will operate approximately seven months per year, with a winter shutdown period. Waste will not be temporarily stored in the ICDF landfill during winter shutdown periods. Drawing C-201 of the Remedial Design/Construction Work Plan (RD/CWP) (DOE-ID 2002a), shows the proposed site plan of the ICDF Complex.

1.2 Plan Organization

The WPP is organized as follows:

- Section 1—Introduction
- Section 2—Waste Material Descriptions
- Section 3—Waste Placement Procedures
- Section 4—References.

2. WASTE MATERIAL DESCRIPTIONS

2.1 General

The ICDF Complex is designed to provide for the disposal of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation wastes generated at the INEEL. Most of the waste will be contaminated soil, but debris and CERCLA investigation-derived waste (IDW) will also be included in the waste inventory. The ICDF Complex will accept only low-level, mixed low-level, hazardous, and limited quantities of Toxic Substances Control Act (TSCA) wastes for disposal.

The Staging, Storage, Sizing, and Treatment Facility (SSSTF) documentation provides the proposed operations and restrictions for waste entering the ICDF Complex. Both the ICDF *Waste Acceptance Criteria for the ICDF Landfill* (DOE-ID 2002b) and the *Waste Acceptance Criteria for the ICDF Evaporation Pond* (DOE-ID 2002c) further describe physical, chemical, and radiological properties, and quantities of wastes.

2.2 Waste Form

The majority of waste to be placed in the ICDF landfill is soil and soil-like material. Additional waste materials that are shown to meet the ICDF Waste Acceptance Criteria (WAC) include: building debris, concrete (monoliths and rubble), and containerized material (boxes and drums). Building demolition debris will include beams (steel and concrete), concrete rubble, pipe, etc. Sizes evaluated for beams were 1.5 ft wide by 1.5 ft deep by 20 ft long, and for concrete rubble were approximately 12 in. in diameter. Other debris could be crushed during placement operations in the landfill by multiple passes of operations equipment. Concrete monoliths are assumed to be 8 ft × 10 ft × 3 ft with an estimated weight of 18 tons. There is a potential for overpacked drums to be placed in the landfill. If these overpacked drums are identified for disposal at the ICDF, specific placement methods, such as grouting the void space in the overpack or crushing the overpack during placement, will be implemented to conform with WAC requirements. The majority of wastes are anticipated to be delivered as bulk shipments.

The containerized waste to be placed in the ICDF landfill will typically be placed in wooden or steel boxes and drums. The size and estimated weight of the boxes and the size of the drums are as follows:

- 4 ft × 4 ft × 8 ft steel or wood box: estimated weight is 8 tons
- 4 ft × 4 ft × 4 ft steel or wood box: estimated weight is 4 tons
- 35-gallon drums
- 55-gallon drums.

2.3 Restricted Waste Materials

Materials prohibited from the ICDF Complex disposal are described in the ICDF Landfill WAC (DOE-ID 2002b).

2.4 Evaporation Pond Waste Delivery Requirements

Waste designated for the ICDF evaporation pond will be in liquid form. The ICDF Complex leachate will be pumped to the ICDF evaporation pond from the leachate collection sump.

Evaporation pond waste requirements are described in the ICDF Evaporation Pond WAC (DOE-ID 2002c). The delivery procedures for the Evaporation Pond are described fully in the Operations and Maintenance (O&M) Plan. In general, monitoring well purge and development water will be delivered in tanker trucks and pumped to the pond. The SSSTF decontamination water will be collected in a lift station and pumped to the ICDF evaporation pond by a pressure pipeline. As an option, tanker trucks could be used to transfer the ICDF decontamination wastewater to the ICDF evaporation pond.

3. WASTE PLACEMENT PROCEDURES

3.1 General

This section of the WPP describes the general procedures for placement of waste material in Cell 1 and Cell 2 of the ICDF landfill. Placement procedures for specific waste material are described below.

3.1.1 Protection of Facilities

Waste material placement activities shall be conducted in a manner that protects and maintains the integrity of the liner system, leachate collection system, final cover system, and all ICDF landfill ancillary facilities and equipment. Slope stability assessments (EDF-ER-268) were performed to aid in the design of the liner system for the ICDF landfill and the ICDF evaporation pond. The proposed side slope design was evaluated under a range of loading conditions and determined to satisfy the minimum requirements for stability. In addition, anchorage of the high-density polyethylene (HDPE) geomembrane, as demonstrated in the H-200 series design drawings, was determined to meet the minimum requirements for stability (EDF-ER-268). Evaluations performed in the Slope Stability Assessments (EDF-ER-268), the Landfill Compaction/Subsidence Study (EDF-ER-267), and the Waste-Soil Design Ratio Calculations (EDF-ER-277) aided in the development of waste placement activities. The recommendations and conclusions made in these evaluations are incorporated throughout this WPP and are designed to further provide for protection of the ICDF landfill and the ICDF evaporation pond. Waste material placement activities shall not commence in Cell 1 until the liner system has been completed in accordance with the regulatory requirements and cell construction has been completed and operations are allowed to proceed. The same requirements will apply to the future development of Cell 2.

During operations, certain materials will be strictly prohibited from disposal in either the ICDF landfill or the ICDF evaporation pond. Those prohibitions are described in the WACs for the ICDF landfill (DOE-ID 2002b) and for the ICDF evaporation pond (DOE-ID 2002c). Waste material will be placed in accordance with BBWI procedures.

During operations, there may be risk of radiation exposure to workers. In the event of such an occurrence, BBWI procedures will be followed. These procedures will include additional PPE for worker safety, additional monitoring, and placing operational cover over material that contains a risk of radiation exposure. The level of protection and the amount of soil cover will depend on the potential risk of exposure.

Dust control will be necessary during transportation, placement, and compaction. This will be accomplished by using water truck(s) and/or soil fixatives. Fixatives used for dust control shall be reviewed prior to application for potential affects on landfill leachate and landfill surface runoff. Over-application of water resulting in free liquids will not be allowed because of waste minimization controls. Dust will be monitored at the ICDF landfill. If required and specified, fixatives may be used to mitigate dust control. To prevent wind dispersion and dust generation from contaminated materials, during winter season shut-down periods and for use as daily/interim covers, fixatives will be applied over contaminated material. Dust control will be in accordance with IDAPA 58.01.01 and all applicable INEEL standards.

Work will be restricted or suspended if unacceptable amounts of dust are being generated as determined by the field team leader, health and safety officer, and/or radiological control technician (RCT). Dust may be the result of dry soil (which may require wetting down) or wind. All excavating, loading, hauling, and dumping operations will be suspended when wind speeds are determined excessive. Work areas that have the potential of generating dust will require spraying by a water truck.

3.1.2 Quality Assurance

Quality assurance requirements are defined in the quality program contained in Manual 13A for the ICDF Complex.

3.1.3 As-Placed Map

The coordinate system and the methods for dividing the landfill into a 50-ft by 50-ft grid spacing for each 5-ft elevation for the As-Placed Map is documented in EDF-ER-322, the "Waste Mapping Plan." (The specific size of grid is still under discussion and will be addressed in the ICDF Complex Remedial Action Work Plan.) As the day-to-day operations occur in the ICDF landfill, the height of the waste will be monitored for each waste placement area. When the waste for a specific operation reaches the required height for mapping, at 5′-0″ elevation intervals, it will be mapped in accordance with the BBWI procedures.

3.1.4 Facility Access

Access to the ICDF landfill Cell 1 disposal area will initially be from the south, unlined portion of the excavation. The operations vehicle access road consists of a clean gravel surfaced road with a maximum 10% grade onto the bottom of the excavation. A clean granular fill bridge will be constructed to connect the south access road to the lined portion of Cell 1 (see Figure 3-2A.) Once the clean bridge is developed, waste fill will then be placed to support the continuation of the haul road to the northwest corner of Cell 1. The clean haul road surface will be extended when the waste fill has been brought up to the height of 10 ft, the height of an operational lift. Clean granular fill will be placed and compacted on top of the operational lift to continue the clean working face. Clean granular fill will be approximately 18 in. thick.

Once the haul road has been constructed to the northwest corner, the northwest corner will be developed in a series of 10-ft-thick operational lifts to reach the top of the Cell 1 side slope. After the waste fill reaches this point, access to the filling areas will move to the crest of the berm. The clean south access road will be maintained to provide an alternate access route into the fill area until construction begins on Cell 2.

3.1.5 Haul Roads

Haul roads will be constructed within the ICDF landfill Cell 1 and Cell 2 to provide a clean haul surface to the active disposal area(s). Haul roads will be approximately 18 in. thick and consist of compacted granular fill (native alluvium) from the permanent stockpile south of the ICDF. The haul roads will be graded and maintained during filling operations. The haul roads will be a minimum of 30-ft wide to allow two-way traffic with adequate turning radii at all curves. Haul roads will have a maximum slope of 10%.

The initial haul road will be constructed to provide access across the operations layer to the northwest corner of Cell 1 and will be constructed at the base of the south access road. Initially, the haul road will be constructed of compacted granular fill to create a bridge from the south access road to the lined portion of Cell 1. This clean bridge extended a minimum of 15 ft. in from the edge of the liner. After the clean fill bridge is developed, waste placement can begin. Compacted waste fill will then be used to support the continuation of the haul road. When compacted waste reaches the height required to extend the haul road, clean compacted granular fill, approximately 18 in. thick, will be placed on top of the compacted waste. The clean fill will be the foundation for the haul road extension and will provide a clean working surface. As the operations layers become built up over time, fill placement may be

occurring on several layers of waste, and haul roads will be constructed to allow access to the various layers of fill construction as required.

Haul roads will be developed with a hammerhead peninsula to allow for dumping contaminated waste from the haul road, which is a clean surface (see Figure 3-1). The haul roads and dumping peninsulas will be developed and extended as each lift of fill is placed and compacted.

Day-to-day landfill operations will determine the routing and management of haul roads—possibly including one-way usage of haul roads to accommodate a specific haul or specialized equipment. Traffic control signage will be posted as required.

3.2 Filling Sequence

3.2.1 Filling Sequence Overview

The filling sequence will begin with the initial operational lift. Operational lifts are 10 ft thick and consist of ICDF landfill waste soil and debris. The filling sequence will be built up in three operational lifts to reach the crest of the excavation.

The initial 10-ft-thick lift will consist of two types of waste fill. Select waste fill will be placed for the first 5 ft of the operations lift. Select waste fill consists of waste soil that contains no large metal, concrete, or other material that may damage the liner system. No debris will be allowed in the first 5 ft of fill. The subsequent 5 ft will consist of general waste, which may include debris.

The next two 10-ft-thick operational lifts will consist of general waste, which may include debris. Debris will not be allowed within 50 ft of the edges of the landfill or within 5 ft of the final cover.

Each of the 10-ft-thick operational lifts consists of individual 12-in. compacted layers. The compacted layer thickness may vary with the type of material placed in the cell, depending on final BBWI operating procedures. Each individual, compacted 12-in. layer is placed, graded, and compacted until reaching the 10-ft-thick operational lift requirement. A 2-ft-thick clean soil fill operational cover will be placed over the final operational lift to provide clean access to the working face and a final interim clean cover. The landfill has been designed for the current estimated volume of waste (510,000 yd^3). During the lifespan of the landfill, the total volume of waste and the waste streams will become further understood and defined. When the volume of waste entering the landfill is at this more definitive stage, the final volumes, final contouring, and final elevations will be evaluated. It may be necessary for future plans (which would require regulatory approval) to allow for the volume of waste to dictate the final contouring and final elevation for waste placement.

The conceptual fill sequences are presented below. Actual fill sequences may vary based on volume and type of incoming fill. The sequence of waste placement will begin with the initial waste placement, after the clean soil bridge has been built at the base of the south haul road, and will progress toward the northwest corner. After a minimum 100-ft-wide operational lift of wastes has been placed next to the 3:1 side slopes of the landfill, placement of subsequent operational lifts of wastes can begin. The minimum 100-ft width of the operational lift is designed to protect against shear failure in the liner system and provide buttressing for side slope stability. In addition, the selective placement of materials is designed to further ensure maintenance of liner integrity.

To prevent equipment and personnel from exposure or contact with contaminated materials, operational cover or fixative will be applied on an as-needed basis. The operational cover would consist of alluvium soils stockpiled from the excavation of the ICDF landfill.

3.2.2 Initial Fill Sequence

The initial filling sequence for Cell 1 will start at the clean soil bridge that connects the south haul road to the landfill. Initially, a dumping peninsula configuration will be developed that will allow for trucks to turn around and dump wastes (see Figure 3-1). Waste will be built up to support the expansion of the haul road to the northwest corner and the development of the initial 100-ft-wide buttress in the northwest corner. The dumping peninsula and the haul road will be built up of 12-in. layers that are compacted and brought to the 10-ft operational lift thickness. The initial fill sequence will then proceed to the northeast and southeast corners (see Figures 3-2A, 3-2B, and 3-2C).

The initial fill sequence will consist of two types of waste fill: select soil waste, in the first 5 ft of the operational layer; and general waste fill in the second 5 ft of the initial operational layer. The select soil waste (i.e., contains no large metal, concrete, or other material that may damage the liner system) shall be placed in 12-in. layers and compacted. The first 2 ft of the select soil waste placed over the operations layer may be limited to a maximum fines content of 20% to limit the possibility of future clogging of the leachate collection recovery system (LCRS) gravel, as specified in the "Landfill Leachate Collection System Design Analysis" (EDF-ER-280). No boxes, demolition debris, or concrete shall be placed in this initial layer of select fill.

After the select soil waste fill is placed and compacted, an additional 5-ft-thick layer of general waste fill shall be placed in 12-in. layers and compacted to reach the desired 10-ft-thick operational lift.

If select fill is not available, an alternative would be the placement of a geotextile over the operations layer, installed prior to waste placement. The geotextile would serve the same purpose as the select fill, protecting the liner from puncture and also keeping silty soil from proximity to the leachate collection system. If this geotextile option is implemented, the most granular select soil available will be utilized for the select soil waste zone in accordance with the "Landfill Leachate Collection System Design Analysis" (EDF-ER-280).

3.2.3 Subsequent Layers

Subsequent layers of waste fill can be placed on top of the compacted initial operational lift after a minimum 100-ft-wide buttress has been developed. The northwest corner will be the first area of Cell 1 to develop the 100-ft-wide buttressing, and the northwest corner will have additional lifts placed while the initial filling sequence will continue toward the south and east. The operational lifts will be completed in the northwest corner first, such that a new access road can be placed on the north side of the ICDF landfill.

As operational lifts increase in elevation, the final lift will be constructed 2 ft lower than the exterior berm edge, such that runoff water will be adequately collected in the landfill (see Figure 3-4). Lifts will also be developed and compacted to have sufficient capacity to prevent overtopping.

Each individual layer of waste material should be spread in thickness of 12 in. (or as required). Each loose layer shall be compacted and tracked prior to additional layers being placed on top. All material placed within 5 ft of the operation layer must comply with the requirements of the initial 10-ft-thick fill lift above. The conceptual fill sequence is shown in Figure 3-3. Actual fill sequence may vary based on volume and type of incoming fill. As operations proceed, multiple haul roads and dumping peninsulas will be developed to support the multiple work faces of the operational lifts. Figure 3-4 shows a cross section of the filling sequence.

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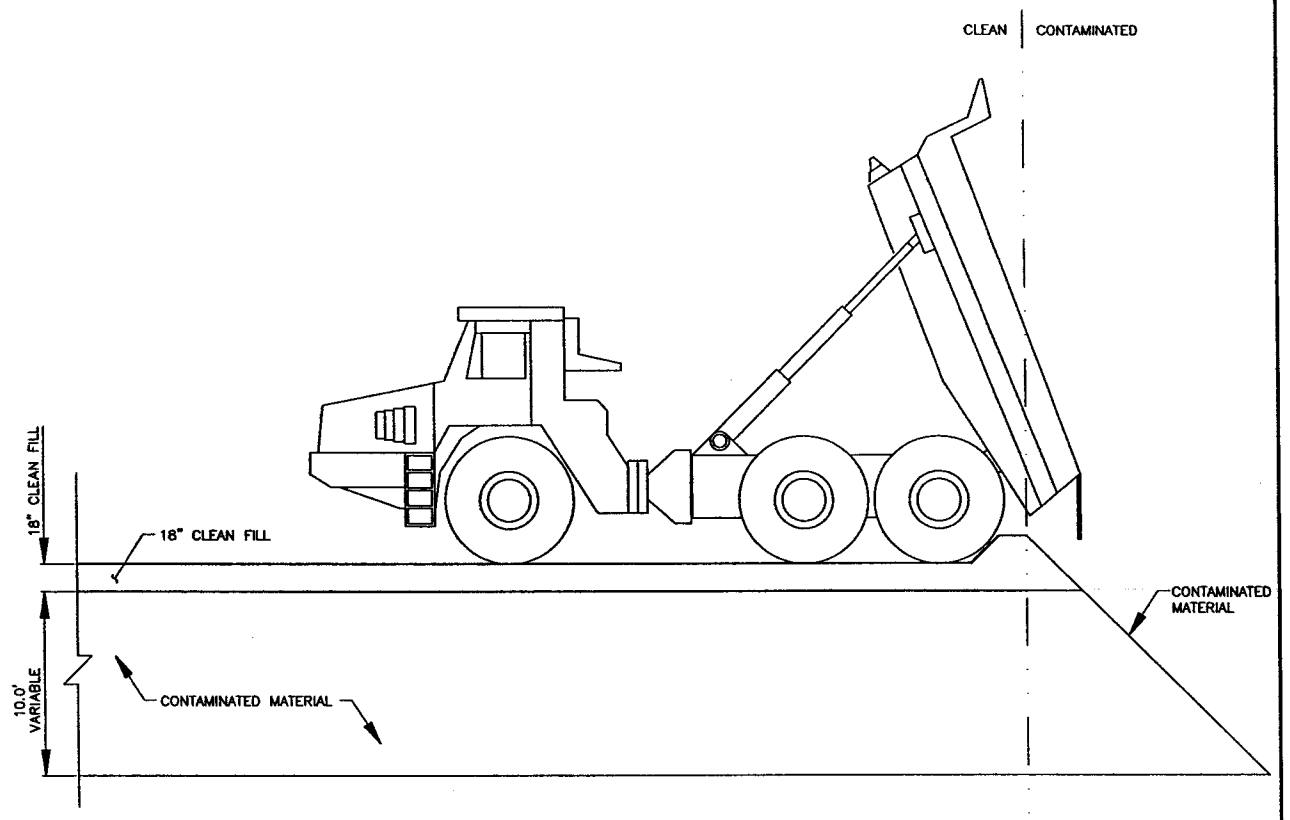
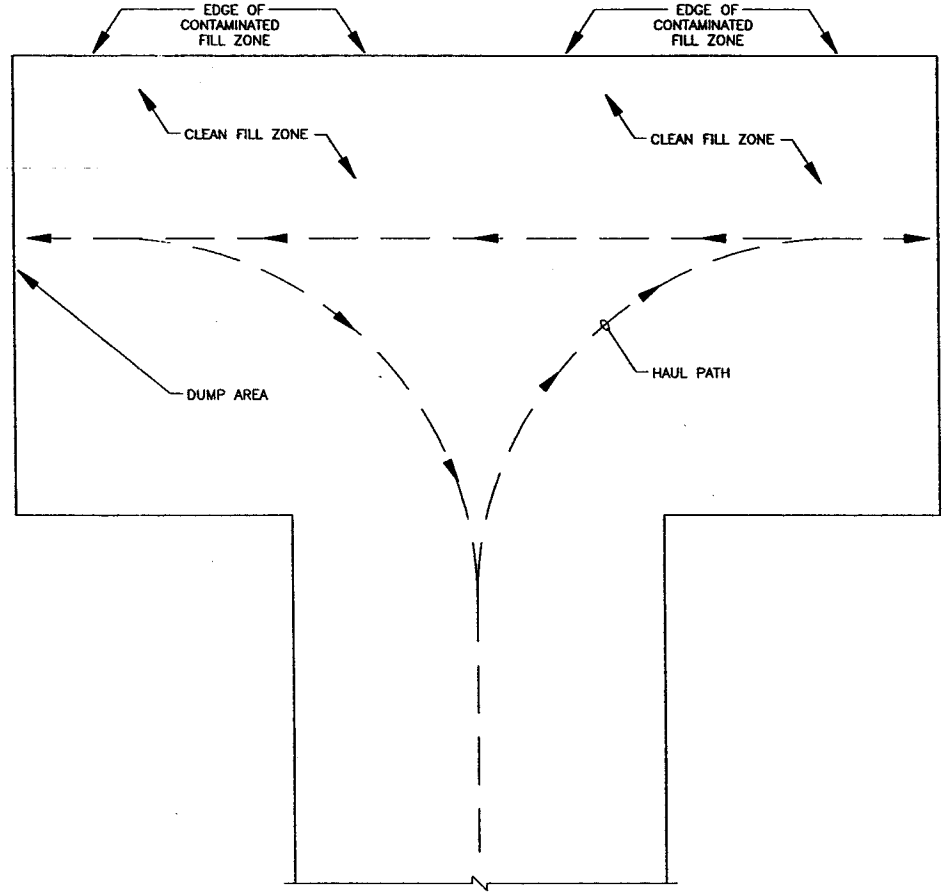


DUMPING DETAIL



HAUL PATH

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REQUESTER:	
DESIGN:	M. THURSTON
DRAWN:	M. RARDIN
PROJECT NO.	PROJ#
SPEC CODE	SPEC-CODE
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	DAR
EFFECTIVE DATE:	

INEEL — Idaho National Engineering & Environmental Laboratory — BECHTEL BWXT IDAHO, LLC

CH2MHILL — MONTGOMERY WATSON

INEEL CERCLA DISPOSAL FACILITY (ICDF)
FIGURE 3-1
CELL FILLING HAUL PATH
AND DUMPING DETAIL

SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CL	ORG	DWG-	REV
D		B21	0500	02		C-03	0

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REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
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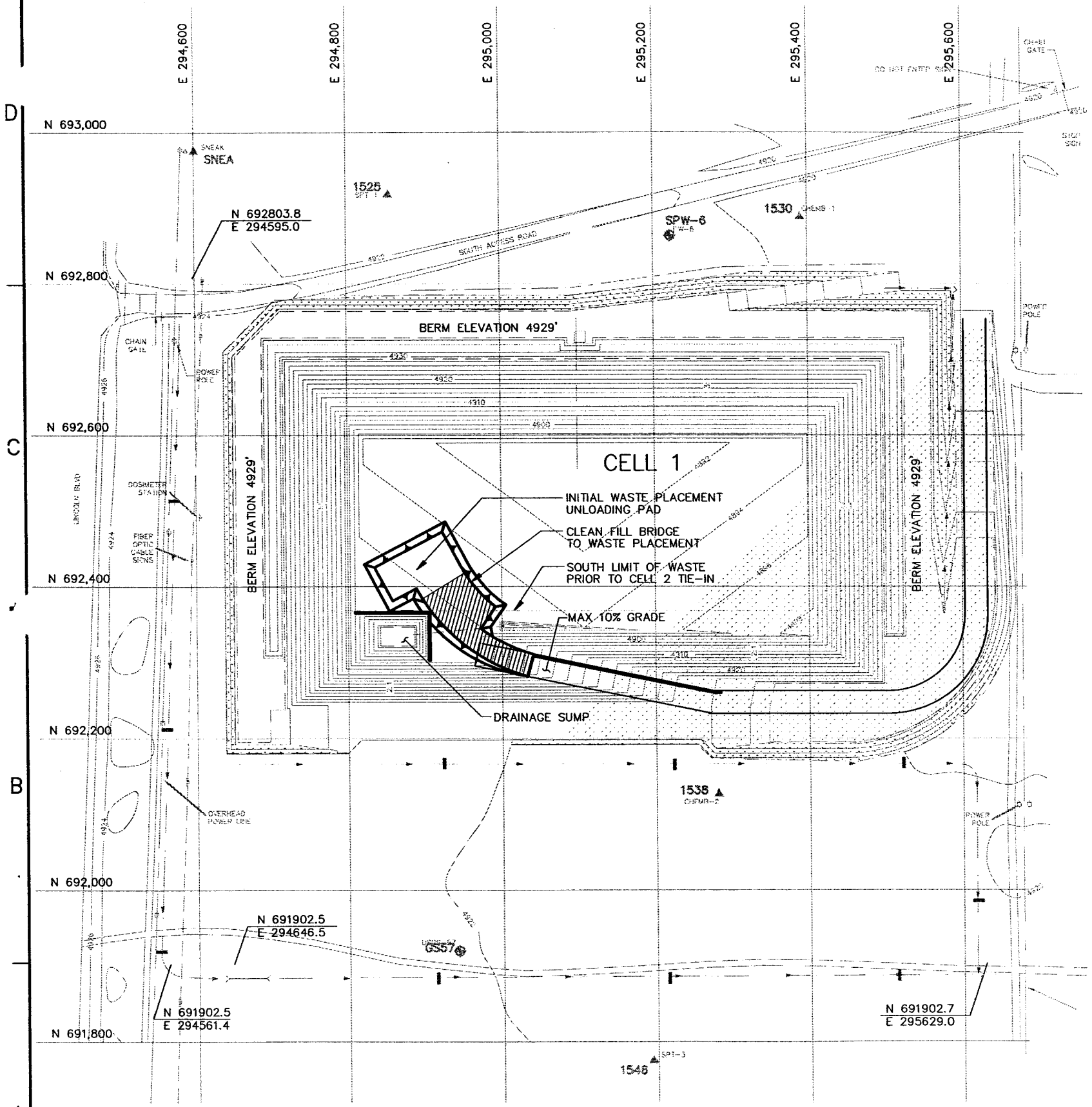

PRELIMINARY
NOT FOR CONSTRUCTION

N

SCALE
80' 0 80' 160'
CONTOUR INTERVAL 2FT.

INEEL — Lockheed Martin Idaho Technologies Company

CH2MHILL — MONTGOMERY WATSON

INEEL CERCLA DISPOSAL FACILITY (ICDF)

FIGURE 3-2A
CELL 1 FILLING SEQUENCE PLAN

SUBCONTRACT NO.	S01-588058
REQUESTER:	
DESIGN:	M THURSTON
DRAWN:	M RARDIN
PROJECT NO.	
SPEC CODE	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	DAR
EFFECTIVE DATE:	

SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D		B21	D100	02		C-01	0

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REVISIONS		
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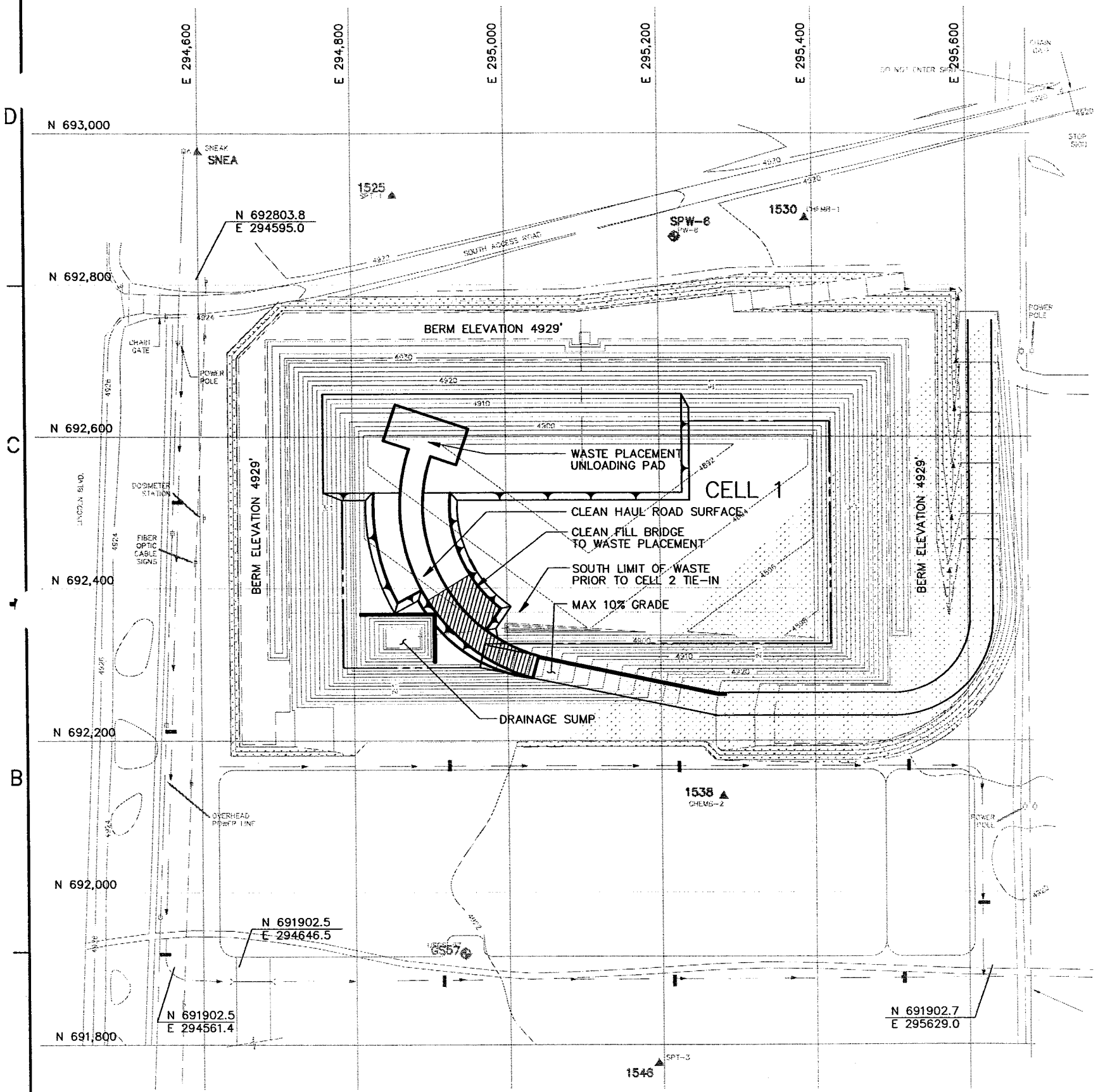

N

SCALE

80' 0 80' 160'

CONTOUR INTERVAL 2FT.

PRELIMINARY
NOT FOR CONSTRUCTION

INEEL — Idaho National Engineering & Environmental Laboratory — BECHTEL BWXT IDAHO, LLC

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INEEL CERCLA DISPOSAL FACILITY (ICDF)

FIGURE 3-2B
CELL 1 FILLING SEQUENCE PLAN

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DESIGN:	M THURSTON
DRAWN:	M RARDIN
PROJECT NO.	
SPEC CODE	
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SIZE	CAGE CODE	INDEX CODE NUMBER (AREA / TYPE / CI / ORIG)	DWG-	REV
D		B21 / D100 / 02 /	C-01	0

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REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
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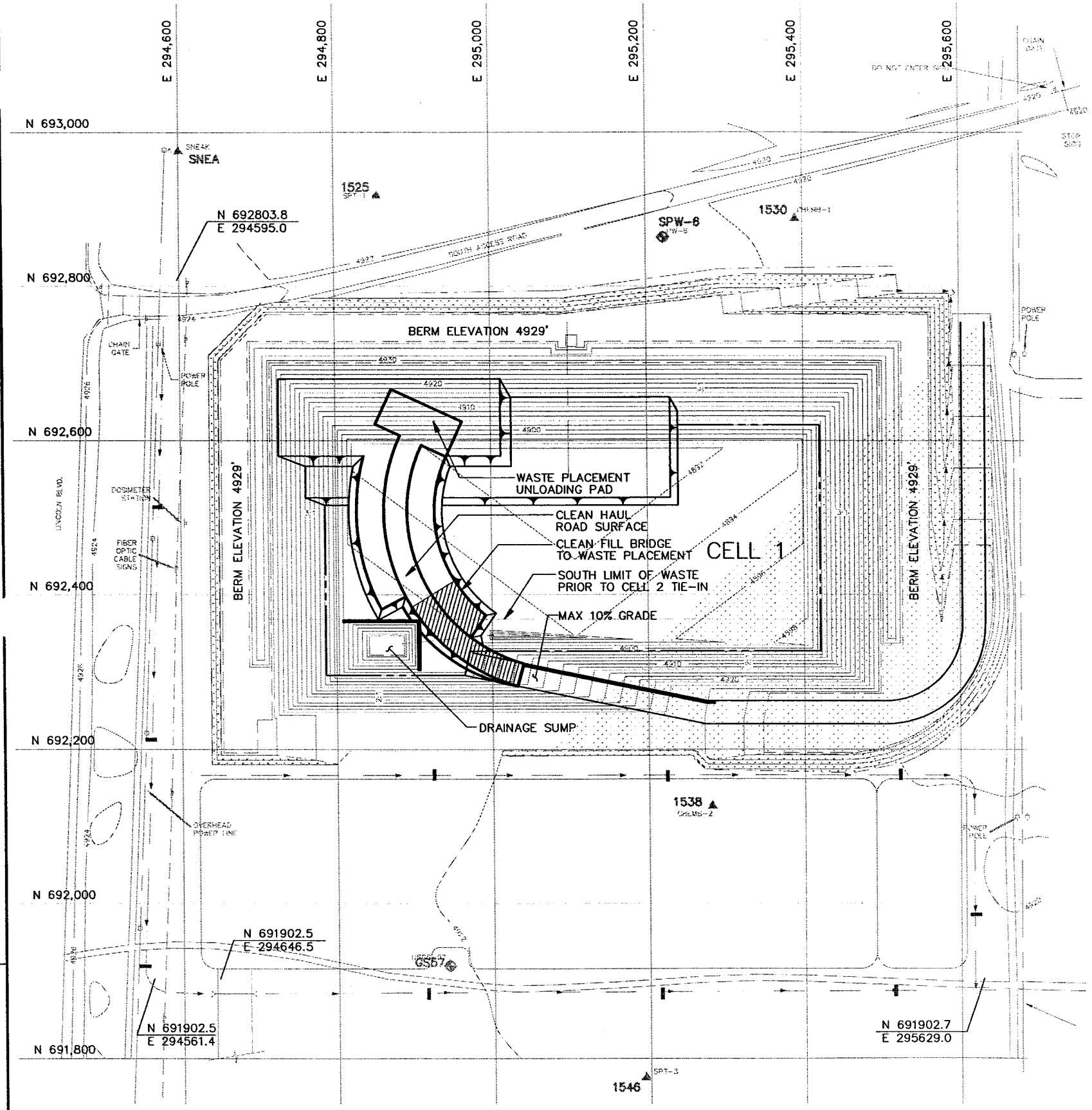

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SCALE

80' 0 80' 160'

CONTOUR INTERVAL 2FT.

PRELIMINARY
NOT FOR CONSTRUCTION

INEEL — Idaho National Engineering & Environmental Laboratory — BECHTEL BWXT IDAHO, LLC

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INEEL CERCLA DISPOSAL FACILITY (ICDF)

FIGURE 3-2C
CELL 1 FILLING SEQUENCE PLAN

SUBCONTRACT NO.	S01-588058
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SPEC CODE	
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SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CI	ORIG	DWG-	REV
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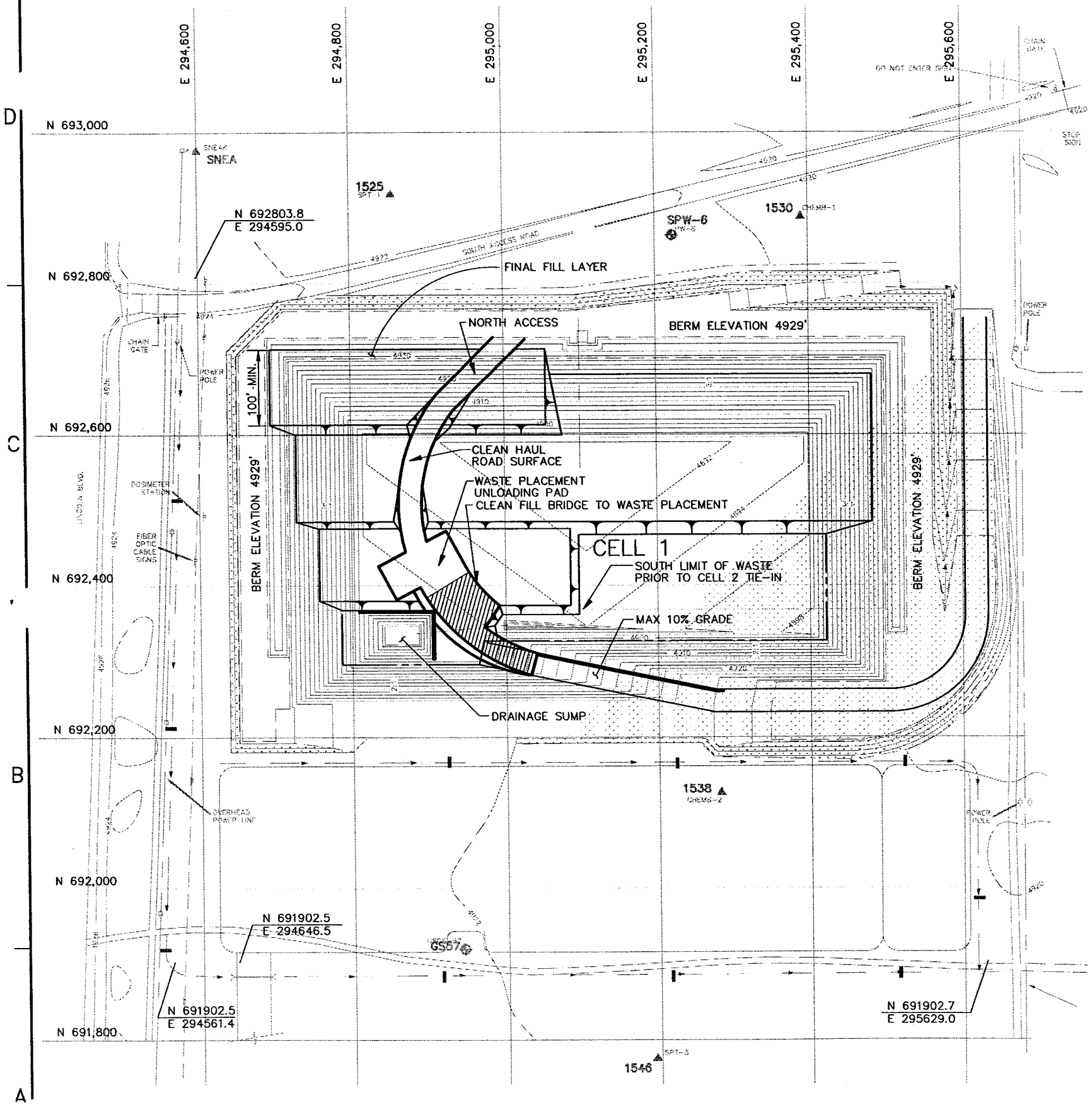

PRELIMINARY
NOT FOR CONSTRUCTION

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SCALE
80' 0 80' 160'
CONTOUR INTERVAL 2FT.

INEEL Idaho National Engineering & Environmental Laboratory BECHTEL BWXT IDAHO, LLC

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INEEL CERCLA DISPOSAL FACILITY (ICDF)

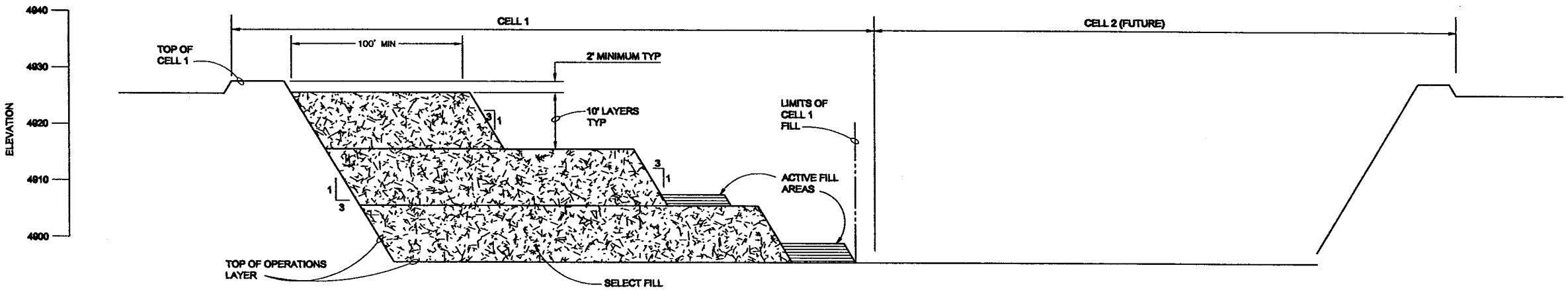
FIGURE 3-3
CELL 1 FILLING SEQUENCE PLAN

SUBCONTRACT NO.	S01-588058
REQUESTER:	
DESIGN:	M THURSTON
DRAWN:	M RARDIN
PROJECT NO.	
SPEC CODE	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	DAR
EFFECTIVE DATE:	

SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D		B21	D100	02		C-02	0

SCALE: AS SHOWN | CPP | SHEET 5 OF 7

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
0	90% DESIGN SUBMITTAL	15 OCTOBER 2001



SCALE:
VERT 1"=10'
HORIZ 1"=50'

NOTES:
1. EACH LAYER MUST HAVE FILLED A MINIMUM OF 100' AWAY FROM THE SIDESLOPE PRIOR TO PLACING ADDITIONAL VERTICAL LAYERS
2. DEBRIS WILL NOT BE PLACED WITHIN 50' FROM THE SIDE SLOPES.

INEEL — Idaho National Engineering & Environmental Laboratory — BECHTEL BWXT IDAHO, LLC

CH2MHILL — MONTGOMERY WATSON

INEEL CERCLA DISPOSAL FACILITY (ICDF)
FIGURE 3-4
CELL FILLING SECTION

SUBCONTRACT NO.	S01-588058
REQUESTER:	
DESIGN:	M THURSTON
DRAWN:	M RARDIN
PROJECT NO.	PROJ#
SPEC CODE	SPEC-CODE
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	DAR
EFFECTIVE DATE:	

SIZE	CAGE CODE	INDEX CODE NUMBER (AREA / TYPE / CI. / ORIG)	DWG-	REV
D		B21 / 0500 / 02	C-03	0

SCALE: AS SHOWN | CPP | SHEET 6 OF 7

3.2.4 Future Development of Cell 2

Before Cell 2 is filled, a revision to this WPP that incorporates the access roads, haul roads, filling sequence, and operations of Cell 1 may be necessary. Cell 2 filling can commence when all Cell 2 construction and construction quality assurance (CQA) activities are complete. The sump in the southwest corner of Cell 1 (Figure 3-2A) is to contain the surface water runoff from the unlined portion of Cell 1. This sump will be removed as a part of the tie-in to Cell 2. The water that is collected in the drainage sump is expected to drain through soil percolation and evaporation. During Cell 1 operations, periodic pumping of clean storm water may be necessary for maintenance of the sump or to maintain sump capacity. Storm water would be analyzed and determined to be uncontaminated prior to discharge to the perimeter storm water ditch. Contaminated water would be discharged to the leachate collection system. The initial filling sequence into Cell 2 will follow a filling sequence similar to that used in Cell 1 (e.g., a 5-ft-thick select fill on operations layer, a completed 10-ft-thick lift with general fill, and the minimum 100-ft-wide buttress layer maintained adjacent to side slopes). Cell 2 will be accessed by the haul roads that will be developed across Cell 1. (An alternate approach for future evaluations of the Cell 2 construction and development, would be to develop an additional egress into and out of Cell 2 along the south side of Cell 1 in the south-facing waste slope, utilizing the east access road.) Figure 3-5 shows an example of the planned filling sequence in Cell 2.

In addition, Cell 1 operations need to be considered for the dovetailed sequence of work leading to the development of Cell 2. The maximum extent of waste placed in Cell 1 will be controlled by several factors: the maximum height of waste allowed, the waste placement boundaries established by the placement of the Cell 1 liner (15 ft away from the edge of the liner), and Cell 1 storm water control and management. The BBWI detailed operations schedule developed for Cell 2 construction should consider the generation of Cell 1 storm water runoff. Storm water runoff that comes off the contaminated waste fill shall be considered contaminated.

As Cell 1 waste fill placement develops, careful operations will be required to prevent runoff from the waste fill onto the south unlined portions of the landfill. As waste placement of Cell 1 builds up at the 15-ft waste placement boundary on the liner, storm water runoff will be an issue based on the height and location of the waste. While enough storm water space is available for water that percolates through the waste layers into the leachate collection system, careful attention will be required such that the generation of storm water will not exceed the capacity of the south berm provided for storm water retainage. An option may be the placement of a clean liner cover to go over the exterior slope of wastes that have been placed on or near the south waste placement boundary.

Once construction of Cell 2 is complete, the entire interior of the ICDF landfill will be lined. However, until Cell 2 construction is complete, Cell 1 waste placement management must take into consideration the generation of the contaminated storm water runoff of Cell 1 wastes and the capacity of the south storm water berm.

3.2.5 Settlement

Settlement of the waste materials is expected to occur, primarily due to consolidation of the waste soil and some degradation. The "Landfill Compaction/Subsidence Study" (EDF-ER-267) presents a detailed evaluation of settlement.

Based on the results of the Compaction/Subsidence Study, the design cover slope can accommodate placement of waste materials including bulk waste soils, building demolition material, and other waste containers throughout the facility's waste depth profile without adverse impact to long-term cover performance. However, since the projected Design Inventory (described in EDF-ER-264) identifies

the majority of wastes to be bulk soils, it is recommended that the non-bulk soil material be distributed around the landfill as uniformly as possible. At a minimum, it is recommended that the non-bulk soil material be placed in alternate grids (i.e., a one-grid minimum separation) in the vertical profile of the landfill.

3.3 Filling Operations

3.3.1 General

The materials planned for disposal in the ICDF landfill have unique characteristics for unloading, placement, and compaction. The following sections describe those operational issues for waste placement. In addition, recommended placement configuration of containers and building demolition material is provided. Determination of placement configuration was made from the waste-soil evaluations performed in the "Waste-Soil Design Ratio Calculations" (EDF-ER-277). Waste-to-soil ratio determinations are affected by several factors, including haul road management, interim cover requirements, severe weather operations, and waste material characterization. Filling operations described in this WPP shall be coordinated with all detailed BBWI ICDF landfill operating procedures (e.g., waste segregation, transportation plans, record keeping, and severe weather operation).

Special care will be required for equipment operation around and on the side slopes. Only a low ground pressure (LGP) bulldozer, in accordance with the technical specifications, should be used for construction and maintenance directly on the side slopes until the initial fill layer is placed over the operations layer. Bulldozers or other equipment should not be operated on the slope during or soon after periods of heavy rainfall until the initial fill layer is placed over the operations layer. In addition, placement of debris will not be allowed within 50 ft of the side slopes.

3.3.2 Soil

The majority of the material sent for disposal in the ICDF landfill will be bulk waste soils. These waste soils will be transported to the site in self-dumping vehicles. The placement of this material is expected to be accomplished by standard construction methods for unloading, spreading, grading, and compaction of soils.

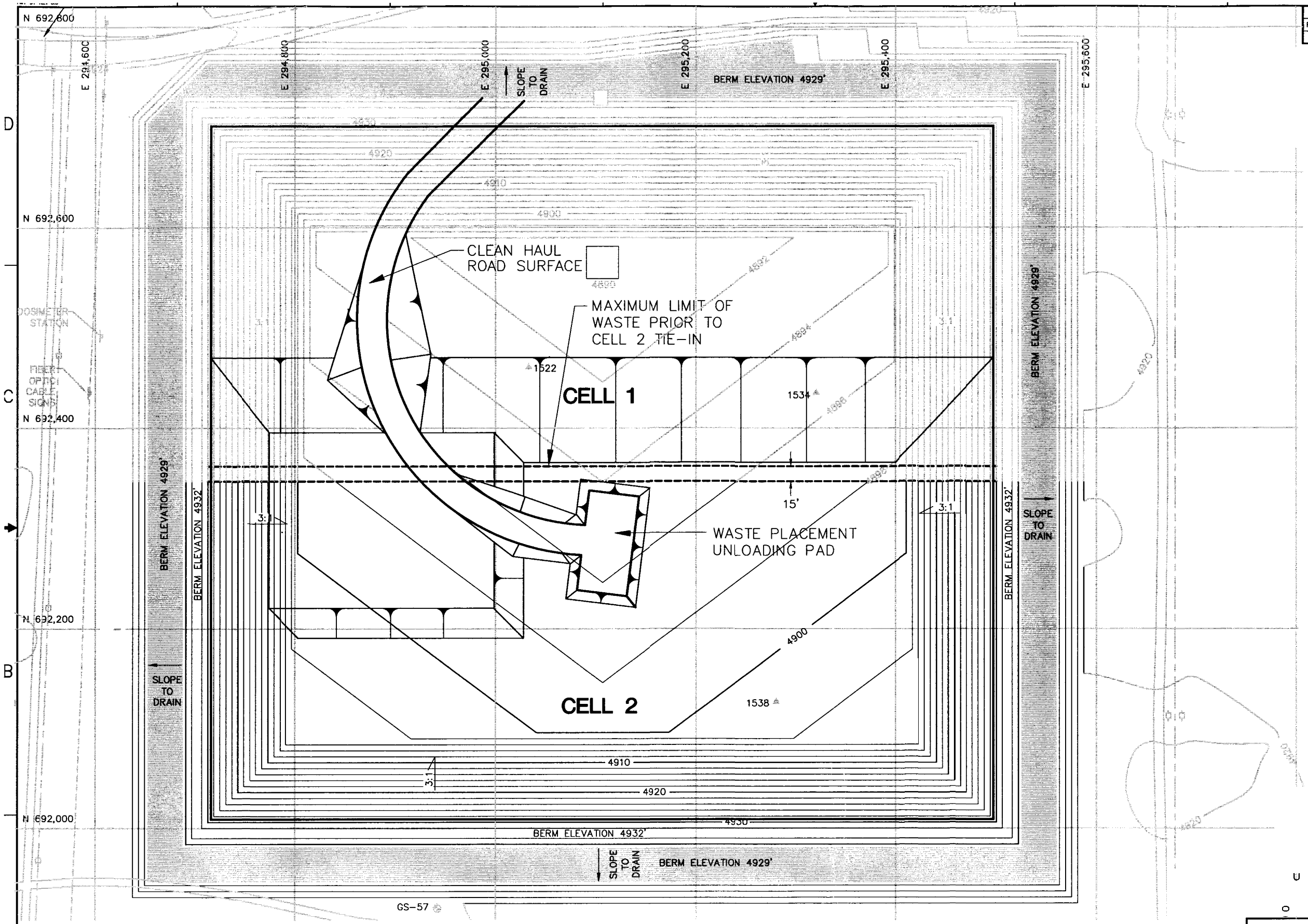
- **Unloading:** Trucks shall dump the waste soil at the direction of the field coordinator.

- **Placement Procedures:** The waste soil shall be spread by the ICDF landfill equipment in 12-in. loose lifts and then compacted as described below. Moisture conditioning should be used with the use of appropriate equipment to ensure adequate compaction. Before additional lifts of soil are placed, the previous lift shall be track walked with a bulldozer and moisture conditioned. The purpose of this preparation is to promote adhesion of the previous lifts and the new lifts and to mitigate preferential pathways forming between adjacent lifts. Additional 12-in. loose lifts shall be placed and compacted until the full height of the 10-ft operational lift is achieved.

3.3.3 Containers

Containers will include wooden boxes, steel boxes, and drums. The wooden and steel boxes may contain soil, stabilized soil material, scrap metal, and building debris. The wooden boxes are assumed to be compressible and able to collapse. Steel boxes and drums are assumed to be completely filled and uncompressible. All container and debris material placement will be according to "Waste Soil Design Ratio Calculations" (EDF-ER-277). Containers may be handled by specialized equipment. Specialized equipment consists of, but is not limited to, loaders, excavators, and cranes.

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
0	90% DESIGN SUBMITTAL	15 OCTOBER 2001



NOTES

1. GRADES SHOWN ARE TO TOP OF OPERATIONS LAYER.
2. EXACT CONFIGURATION OF CELL 1 WASTE PLACEMENT PRIOR TO TIE IN TO CELL 2 WILL BE CONTROLLED BY SEVERAL FACTORS, INCLUDING STORMWATER RUN-OFF AND CONTROL. THIS CONFIGURATION IS FOR ILLUSTRATION PURPOSES ONLY, AND MAY NOT REFLECT THE ACTUAL CONSTRUCTION CONFIGURATION OF WASTE PLACEMENT.

N

SCALE
50' 0 50' 100'
CONTOUR INTERVAL 2FT

INEEL — Idaho National Engineering & Environmental Laboratory — BECHTEL BWXT IDAHO, LLC

CH2MHILL

INEEL CERCLA DISPOSAL FACILITY (ICDF)
FIGURE 3-5
FUTURE CELL 2 FILLING
(CONCEPTUAL)

SUBCONTRACT NO.	S01-588058
REQUESTER:	
DESIGN:	M THURSTON
DRAWN:	M RARDIN
PROJECT NO.	
SPEC CODE	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	DAR
EFFECTIVE DATE:	

SIZE	CAGE CODE	INDEX CODE NUMBER (AREA / TYPE / CI / ORIG)	DWG-	REV
D		B21 / 0500 / 02	C-03	0

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3.3.3.1 Wooden Containers

- **Unloading:** Wooden containers will be unloaded with specialized equipment.

- **Placement Procedures:** All wooden containers shall be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below, to prevent the creation of excessive localized void space. The wooden containers will be placed so that the equipment used to spread the material can crush the containers.

Wooden containers shall be crushed and their contents (soil, plastic liner, and wooden container) will be evenly spread to allow thorough compaction of the material. This material will be mixed with bulk soil waste to minimize void spaces within the lift. Lifts of 12 in. will be allowed for this material.

- **Placement Configuration:** Recommended placement of containers, including long and short boxes is shown in Figures 3-6 and 3-7. Figure 3-6 identifies placement of long boxes (4 ft × 4 ft × 8 ft) and Figure 3-7 shows placement of short boxes (4 ft × 4 ft × 4 ft). As the boxes are crushed, their contents will be blended with bulk soil. Soil will be brought in 12 in. lifts and compacted using conventional compaction equipment. A 1-ft-thick lift of soil will be placed over the blended zone and compacted.

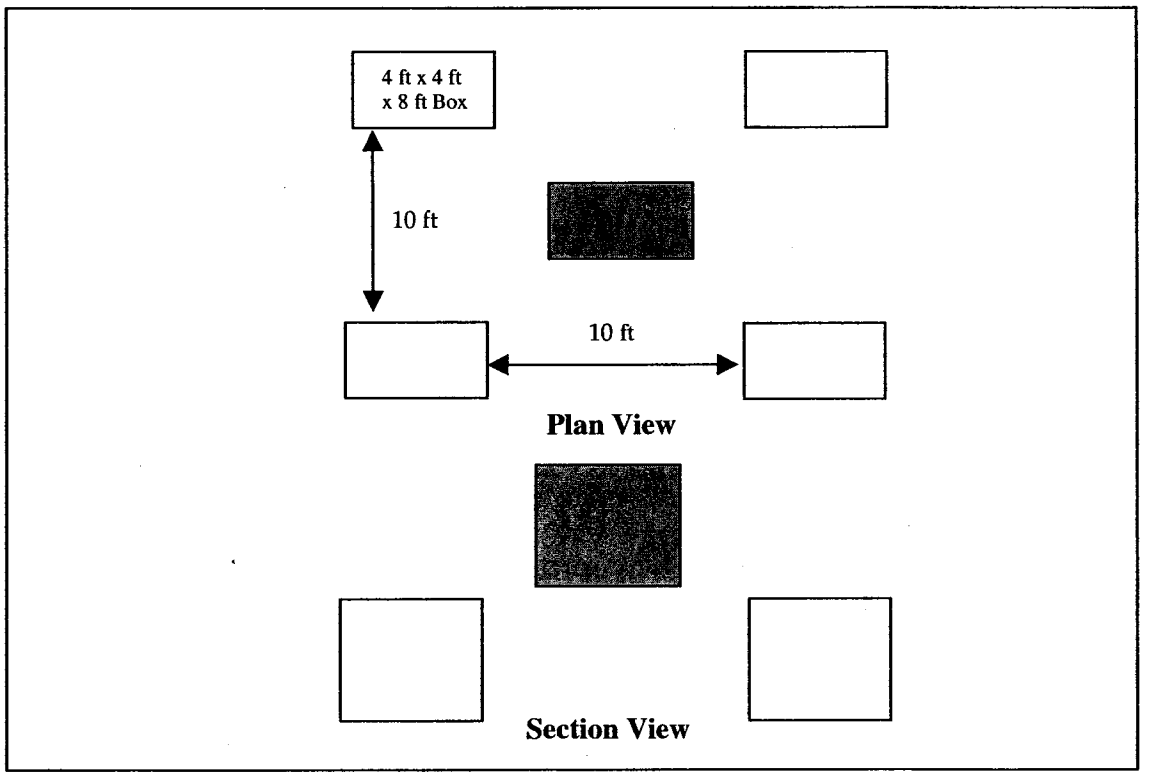

Figure 3-6. Long containers configuration.

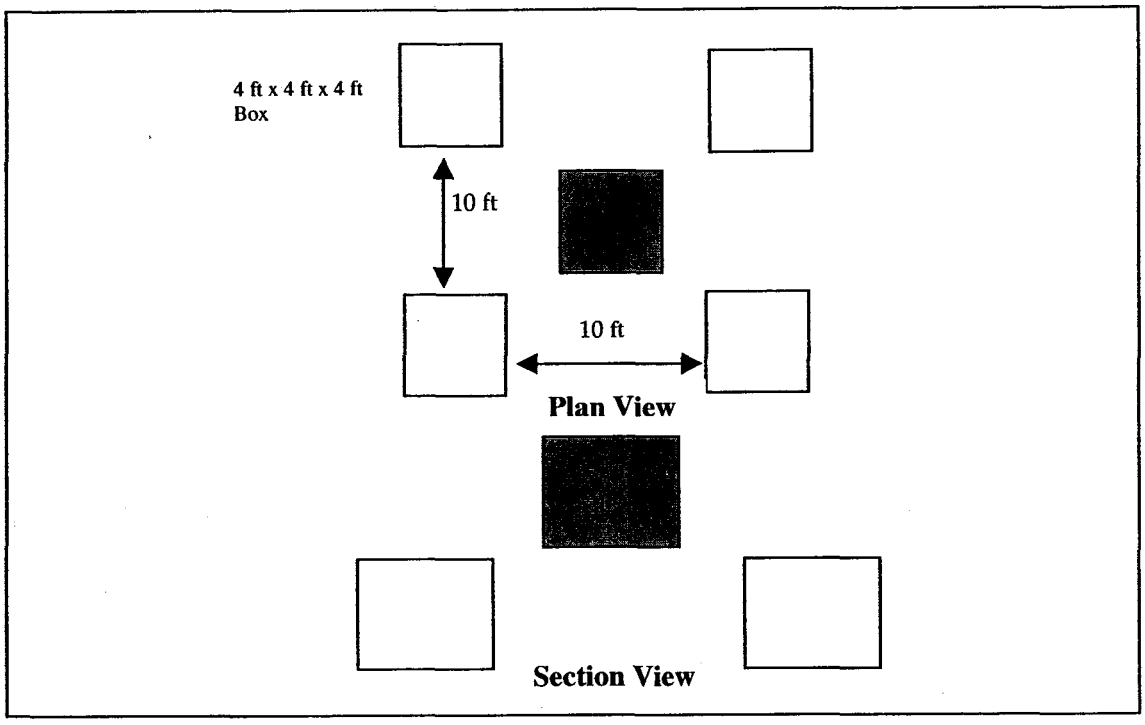

Figure 3-7. Short containers configuration.

3.3.3.2 Steel Containers

- **Unloading:** The steel containers will be unloaded with specialized equipment.
- **Placement Procedures:** All containers shall be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below, to prevent creation of excessive localized void space. The containers will be placed so that the soil between the containers can be adequately compacted by conventional compaction equipment.
- **Placement Configuration:** Recommended placement of containers, including long and short boxes is shown in Figures 3-6 and 3-7 and according to "Waste Soil Design Ratio Calculations" (EDF-ER-268). Figure 3-6 identifies placement of long boxes (4 ft × 4 ft × 8 ft) and Figure 3-7 shows placement of short boxes (4 ft × 4 ft × 4 ft). Soil will be brought in 12-in. lifts and compacted around the boxes using conventional compaction equipment. A 1-ft-thick soil layer will be placed over the boxes and compacted.

3.3.3.3 Drums

- **Unloading:** Drums will be unloaded with specialized equipment.
- **Placement Procedures:** All drums shall be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below to prevent creation of excessive localized void space.

Placement of drums will be dependent on the quantity of drums being placed in the landfill at a given time. For placement configuration see below. Drums will be placed so that soil between the drums can be adequately compacted.

- **Placement Configuration:** If there are a minimum of drums (less than 25 drums), drum placement will be similar to small container placement. The drums will be placed a minimum of 10 ft apart on center. Soil will be placed around and over the drums in 12-in. layers and compacted by conventional compaction equipment.

If there are many drums (more than 25), they will be placed a minimum of 36 in. apart, edge to edge. Soil will be placed around drums and hand compacted with conventional hand compactors, to achieve specified compaction. A 3-ft-thick layer will be compacted over the drums.

3.3.4 Building Demolition Material

3.3.4.1 Steel and Concrete Beams

- **Unloading:** Steel and concrete beams shall be unloaded using specialized equipment.

- **Placement Procedures:** All steel and concrete beams shall be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below to prevent creation of excessive localized void space.

Steel and concrete beams will be placed with a minimum of 1 ft horizontal and vertical spacing between the beams. This is to allow a proper soil envelope around the beams. Concrete and steel beams are assumed to be in pieces that could be placed flat in the landfill, rather than a tangled mass that would be compressible as additional fill is placed. Moisture will be placed as needed to control dust and to achieve compaction requirements.

- **Placement Configuration:** The recommended placement of steel and concrete beams is identified in Figure 3-8. In general, the beams will be placed with soil compacted around them. A 12-in.-thick lift of soil will then be placed on top of the beams and compacted.

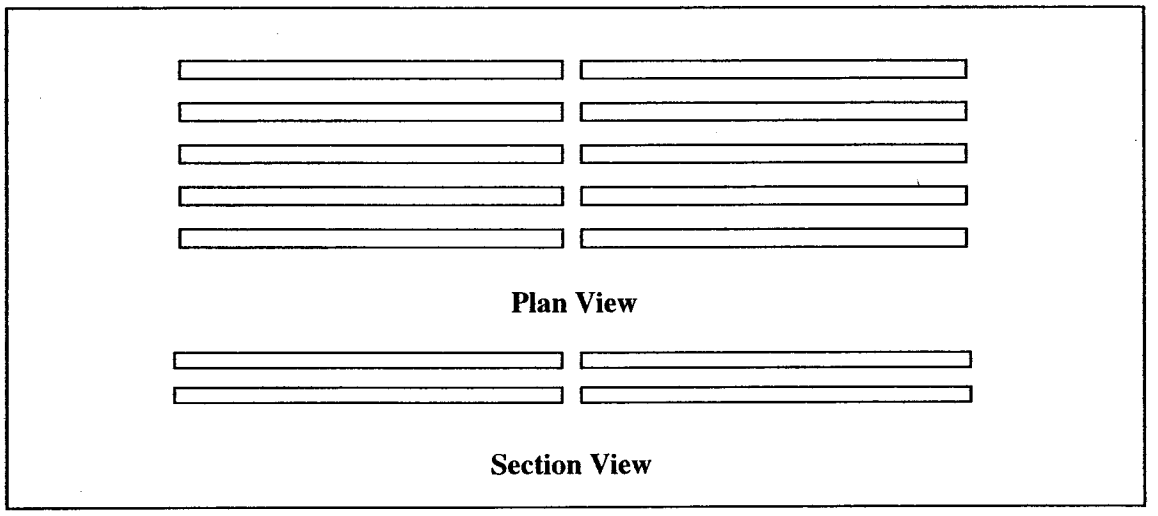

Figure 3-8. Concrete beams configuration.

3.3.4.2 Concrete Monoliths

- **Unloading:** Concrete monoliths are assumed to be 8 ft by 10 ft by 3 ft. Concrete monoliths will be unloaded using specialized equipment.

- **Placement Procedures:** Concrete monoliths will be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below to prevent creation of excessive localized void space. The monoliths will be placed so that the soil between the monoliths can be adequately compacted. Moisture will be placed as needed to control dust and to achieve compaction requirements.

- **Placement Configuration:** The recommended placement of large concrete and building debris building demolition material, including concrete beams, concrete rubble, and concrete monoliths is shown in Figure 3-9. Concrete monoliths will be placed a minimum of 10 ft apart. Soil will be brought up around the monoliths in 12-in.-thick lifts and compacted using conventional compaction equipment.

3.3.4.3 Large Concrete and Building Rubble

- **Unloading:** Large concrete and building rubble is assumed to be approximately 4 ft by 4 ft by 1 ft. Pieces may be flattened at the SSSTF. Large concrete and building rubble will be unloaded using specialized equipment as appropriate.

- **Placement Procedures:** The large building demolition objects shall be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below to prevent creation of excessive localized void space. The material will be placed so that the soil between the material can be adequately compacted. Moisture will be placed as needed to control dust and to achieve compaction requirements.

Building debris will be broken down into pieces prior to placement into the ICDF. These broken-down pieces can be placed flat in the landfill, rather than a tangled mass that would be compressible as additional fill is placed. Disposal of debris has been based on spreading debris to allow complete soil coverage and thus rely on proper compaction of soil for support and not on strength of debris.

- **Placement Configuration:** The recommended placement of large concrete and building debris building demolition material is shown in Figure 3-10. Soil will be brought up around the rubble in 12-in.-thick lifts and compacted using conventional compaction equipment. There will be a minimum 1-ft-thick soil envelope around the large concrete and building debris in order to avoid localized voids.

3.3.4.4 Small Concrete and Building Rubble

- **Unloading:** Small concrete and building rubble will be unloaded using specialized equipment as appropriate.

- **Placement Procedures:** Small concrete and building rubble will placed with a minimum of 1 ft horizontal and vertical spacing between rubble loads. Individual rubble loads will be spread out as necessary to ensure proper filling of voids with soil. Small concrete and building rubble shall be placed a minimum of 5 ft above the operations layer in an area that does not have containers buried directly below to prevent creation of excessive localized void space. The material will be placed so

that the soil between the material can be adequately compacted. Moisture will be placed as needed to control dust and to achieve compaction requirements.

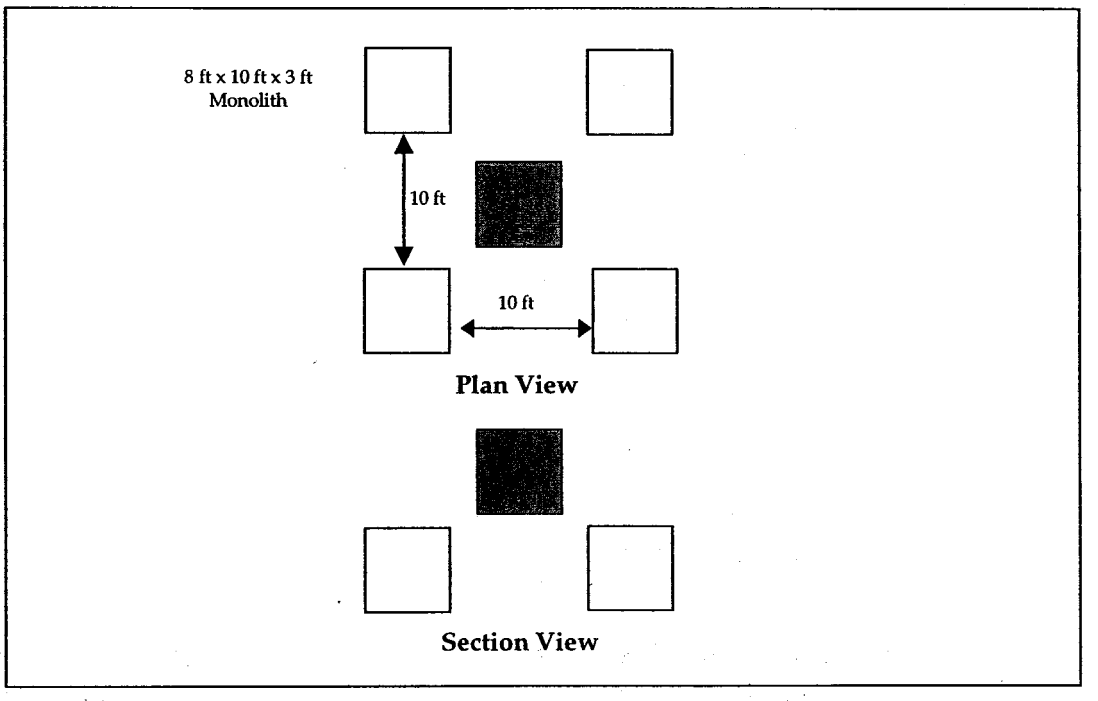

Figure 3-9. Concrete monoliths configuration.

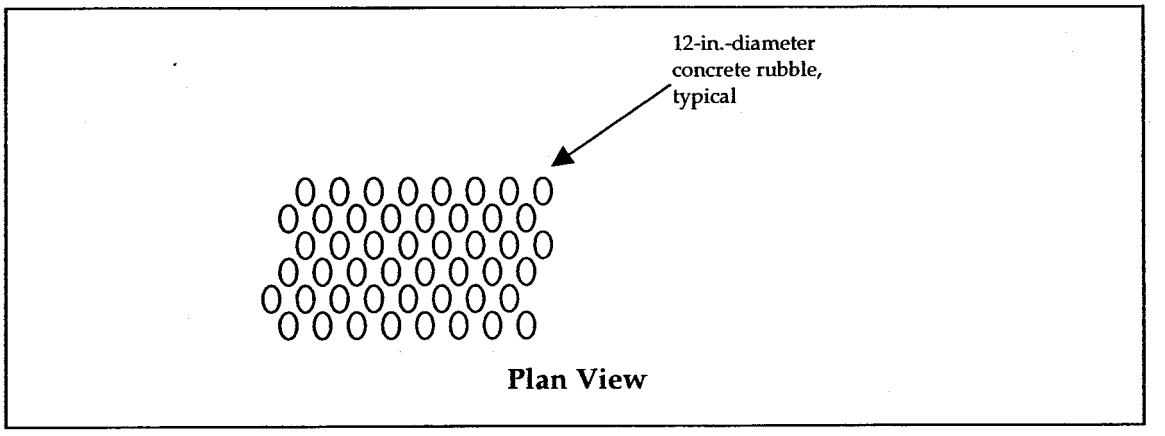

Figure 3-10. Large concrete rubble configuration.

- **Placement Configuration:** The recommended placement of small concrete and building rubble is shown in Figure 3-11. In general, small building rubble will be placed in the landfill with soil placed around the debris. Soil will be brought up around the rubble in 12-in.-thick lifts and compacted using conventional compaction equipment. A 1-ft-thick lift of soil will be placed on top of the rubble and compacted with conventional compaction equipment.

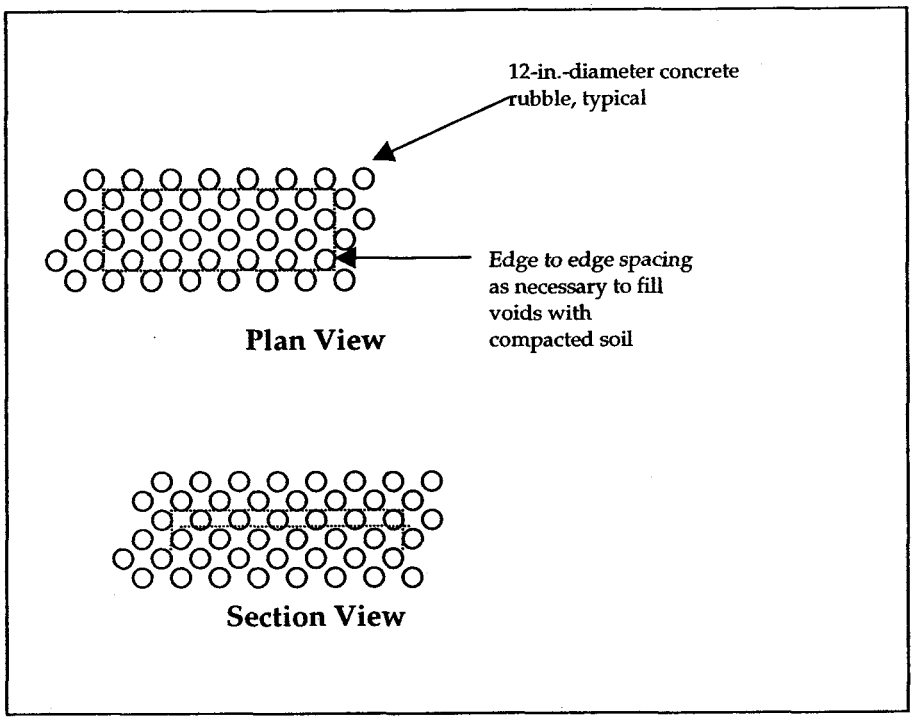

Figure 3-11. Small concrete rubble configuration.

3.3.5 Asbestos Containing Material

- **Unloading:** Approved asbestos containing material (ACM) meeting the WAC may cause fiber release problems if not handled properly. All ACM will be wrapped according to the ICDF Complex requirements. Appropriately wrapped ACM will be brought to the ICDF landfill in haul trucks and unloaded. Specialized equipment will be utilized as required.

- **Placement Procedures:** ACM will be placed in the designated ACM location for each operational layer of waste placement. For each operational layer, the location of the ACM will be different in order to avoid localized voids and to achieve uniform compaction of the landfill. Area designated for ACM will have applicable signage and barricade as required. Moisture will be placed as needed to control dust and to achieve compaction requirements.

- **Placement Configuration:** The asbestos waste will be placed in pre-constructed trenches cut to a minimum depth of 2 ft. The trenches will be created near the bottom of the operational lifts and long enough to accommodate a single layer of the packaged asbestos waste material (i.e., large quantities of ACM will not be stacked on top of a previous layer of ACM). Bulk soil waste of at least 2 ft in thickness will be placed over the asbestos waste prior to compaction. This method will minimize the potential for asbestos fiber releases. The soil will then be compacted using conventional compaction equipment.

3.3.6 Soft Debris

- **Unloading:** Soft debris consists of bulk wood, paper, cardboard, and other biodegradable materials that may cause subsidence problems in the landfill. Soft debris will be brought to the ICDF landfill in haul trucks and unloaded.

- **Placement Procedures:** Soft debris will be placed in the designated soft debris location for each operational layer of waste placement. For each operational layer, the location of the soft debris, similar to the ACM, will be different in order to avoid localized voids and to achieve uniform compaction of the landfill. Moisture will be placed as needed to control dust and to achieve compaction requirements.

- **Placement Configuration:** Soft debris material will be uniformly distributed and placed at the bottom of an operations layer. Soft debris material will not be stacked on top of a previous layer of soft debris. Bulk soil will be placed in 12-in. lifts above the soft debris and compacted, minimizing potential voids and possible subsistence. Soft debris may be staged in the bottom of the disposal cell in boxes prior to incorporation into the working face.

3.3.7 Compaction Recommendations

The "Landfill Compaction/Subsidence Study" (EDF-ER-267) performed subsidence calculations and developed a summary of suggested compaction methods, equipment, and testing methods to ensure uniform compaction of the waste. Table 3-1 provides a summary of the recommended compaction methods and equipment for different waste streams. The detailed compaction requirements should be prescribed as a method specification in conjunction with the WAC and will be based on production, economic, and exposure factors during operation of the ICDF landfill. The specific compaction requirements will be specified in the BBWI detailed procedures.

Table 3-1. Suggested waste compaction requirements and equipment.

Waste	Requirement	Equipment
Fine-grained soils or coarse-grained soils with fines	Minimum three passes with compaction equipment, or number of passes necessary to achieve 90 to 95% relative compaction.	Medium-weight vibratory roller (dynamic forces of 20 to 27 tons) Landfill compactor
Coarse-grained soils (free draining) < 5% fines	Minimum three passes with compaction equipment, or number of passes necessary to achieve 90 to 95% relative compaction.	Medium-weight vibratory roller (dynamic forces of 20 to 27 tons) Landfill compactor
Rock and debris	Mixed with soils during placement. Three passes with a compactor.	Landfill compactor

4. REFERENCES

DOE-ID, 2002a, *INEEL CERCLA Disposal Facility Remedial Design/Construction Work Plan*, DOE/ID-10848, Rev. 1, Appendix Z, "INEEL CERCLA Disposal Facility - Drawings," U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

DOE-ID, 2002b, *Waste Acceptance Criteria for ICDF Landfill*, DOE/ID-10865, Rev. 2, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

DOE-ID, 2002c, *Waste Acceptance Criteria for ICDF Evaporation Pond*, DOE/ID-10866, Rev. 2, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

DOE Manual 435.1-1, "Radioactive Waste Management Manual," U.S. Department of Energy, July 7, 1999.

EDF-ER-264, 2001, "INEEL CERCLA Disposal Facility Design Inventory," Rev. A, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, March 2001.

EDF-ER-267, 2002, "Landfill Compaction Subsidence Study," Rev. 1, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, May 2002.

EDF-ER-268, 2002, "Slope Stability Assessments," Rev. 1, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, May 2002.

EDF-ER 277, 2002, "Waste-Soil Design Ratio Calculations," Rev. 1, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, May 2002.

EDF-ER-280, 2002, "Landfill Leachate Collection System Design Analysis," Rev. 1, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, May 2002.

EDF-ER-322, 2001, "Waste Placement Mapping," Rev. 0 (60% Design Component), Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, November 2001.

IDAPA 58.01.01, 1994, "Rules for the Control of Air Pollution in Idaho," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality (as promulgated May 1, 1994).